DATA DISPLAY USING MULTICOLUMN SCROLLING

Field of the Invention

The present invention relates generally to display of data, and more particularly to displaying scrollable text or data on a computer display.

Background of the Invention

The large computer screen displays and high resolution pixel densities that are now in widespread use make it possible to display many more characters per line than was previously possible. For example, a 21" monitor with 1280x1024 resolution can display upwards to 200 or more alphanumeric characters or other discrete language symbols per line using a visually acceptable size font, such as a 10 point font.

While such large screen displays have the capability to display a large number of alphanumeric characters per line, commonly used text-based documents have a form that is incompatible to a greater or lesser extent with displaying such a large number of characters on a single line. For example, source code rarely goes over 80 characters per line, so it inherently is unable to take advantage of such capacity. Also, the lines of text in printed media, such as newspapers or books, become more difficult or unwieldy to read if too long, such that the reader may be required to turn his or her head to read a line, and potentially lose track of what line of text they are on when traversing from the end of one line to the beginning of the next. As a result, most documents do not exceed approximately 100 characters per line. Thus, while a single line of text could extend from one side of a 200 character per line display to the other, such a display would not likely be preferred by most individuals.

Summary of the Invention

In one embodiment, the present invention provides a method for displaying line-formatted materials on a screen display in two or more adjacent columns, wherein lines spill from the bottom of one column to the top of an adjacent column when scrolling therethrough.

Brief Description of the Drawings

Figures 1 and 2 illustrates the display of source code on a screen display using a prior art technique;

Figures 3A, 3B, 4L, 4R, 5L and 5R illustrate the display of source code on a screen display according to one embodiment of the invention, wherein "L" denotes the left column and "R" denotes the right column; and

Figure 6 illustrates a computer system including the display capabilities illustrated in Figures 3A, 3B, 4L, 4R, 5L and 5R according to one embodiment of the invention.

Detailed Description of the Invention

In the following detailed description of the invention, reference is made to the accompanying drawings which form a part thereof, and in which is shown, by way of illustration, specific embodiments in which the invention may be practiced. In the drawings, like numerals describe substantially similar components throughout the several views. These embodiments are described in sufficient detail to enable those skilled in the art to practice the invention. Other embodiments may be utilized and structural, logical, and electrical changes may be made without departing from the scope of the present invention. The following detailed description is, therefore, not to be taken in a limiting sense, and the scope of the present invention is defined only by the appended claims, along with the full scope of equivalents to which such claims are entitled.

Referring now to Figure 1, there is illustrated a prior art technique for displaying source code on a computer display device 10. Display device 10 includes

a screen display 12, which may be, for example and without limitation, the display surface of a cathode ray tube, a liquid crystal display or a plasma display device. A display area 14 having border 16 defines a window 18 that is actively controlled by the display driver of a computing device (described below) for the purpose of displaying alphanumeric characters or other symbols in a sequence of descending lines (or, alternatively, ascending if desired). Window 18 may, for example, be presented on a 21" (or equivalent metric size) size display with 1280x1024 resolution that can display upwards to 200 or more alphanumeric characters or other discrete language symbols per line using a visually acceptable size font, such as a 10 point font. While window 18 is shown with a visible border 16 for the sake of clarity, it is not necessary that the border 16 be visible. Such a visible border may be present, for example, where the window 18 is created and controlled by a windowing-type based display system, with scroll bar 17a and 17b, such as that used by the Windows 95® operating system available from Microsoft Corporation. Other window may be displayed above, below or on top of window 18, as is conventional.

In Figure 1, a sequence of source code lines 20 is displayed, beginning with the line "#include "raster.h", identified with the reference number 22, and concluding with the line "GE_Void_t", identified with the reference number 24. In this example herein presented Source code 20 generically represents line formatted materials; thus, the invention is in no way limited to use in displaying source code. Source code 20 is shown in greater detail in Figure 2. It is noted that less than approximately one-half (½) the width of window 18 is filled with source code 20. In this mode of display, in order to read the line above line 22, the source code needs to be scrolled down, such that line 22 moves to a line below its position in Figure 1, and line 24 is pushed off of the display altogether. This is conventional scrolling operation. Scrolling may be accomplished by moving a cursor in the direction of the next line "above" or "below" the display area 14, by use of the scroll bar 17a on the side of the window 18, or by any other means.

Referring now to Figures 3A and 3B, there is illustrated a system for displaying and scrolling line-formatted materials according to one embodiment of the invention. As used herein, the term "line-formatted materials" means any information which is organized as a sequence of lines to be displayed in a descending (or ascending) sequence on a screen display, wherein at least some of the lines are made up at least in part by discrete symbols, such as, but not limited to, alphanumeric characters or graphic icons or pictures. Furthermore, line-formatted materials may be displayed in conjunction with graphic elements that precede or follow the materials, or are displayed side by side therewith. For example, displayed text may wrap around a graphic element.

As illustrated in Figure 3A, the sequence of source code 20 is displayed in two columns 30 and 32 within window 18′ in the same display 12, which is the same size as it was shown in Figure 1. Window 18′ is approximately ½ the height of window 18, and includes a visible center dividing line 28 that visually separates each column 30 and 32. However, line 28 may be omitted if desired. Line 22 of the source code is displayed at the top of column 30, in the first or "starting" line of the display area 14. Line 26, now at the bottom of column 32, is the last or "ending" line of the display area 14. As illustrated, only about one-half (½) as many lines of the display 12 are needed to display the same number of lines of code as were required in the prior art display technique of Figure 1. The source code shown in columns 30 and 32 in Figure 3A is shown in greater detail in Figures 4L and 4R, respectively, wherein "L" denotes the left column and "R" denotes the right column.

Figure 3B illustrates the effect of scrolling the source code illustrated in Figure 3A. By scrolling the source code 20 "down," line 22 and the four lines below it are moved off the top of the display area of column 30, five lines from the top of column 32 are moved to the bottom of column 30, and five new lines are added to the display area 14 at the bottom of column 32. Scrolling the source code 20 "up" produces the opposite effect. Thus, the line 36 at the top of column 32 is always the next sequential line following line 34 at the bottom of column 30. This operation can be defined as spilling lines from the bottom of column 30 to the top of

column 32. The source code shown in columns 30 and 32 in Figure 3B is shown in greater detail in Figures 5L and 5R, respectively.

Although the embodiment of Figures 3A and 3B is illustrated with two columns, the invention is no way limited in this respect. Three or more columns may be provided, side by side, with lines spilling from the bottom of the left-most column spilling to the top of the next column over, and so on from the bottom of this column to the top of the next, as the line-formatted material is scrolled. Line-formatted material is thus scrolled through the display area that begins with the starting line at the top end of the left-most column, and ends with the ending line at the bottom end of the right-most column. Of course, the starting and ending lines of the display can be defined differently, provided that these lines start and end at diagonally opposite ends of the display area 14.

Moreover, although the embodiment of Figures 3A and 3B illustrates the display of source code, the invention is equally applicable to the display of any line-formatted materials, as defined above. To reiterate, such line-base materials include, for example, printed materials as may be found in books, magazines or web sites.

In respect of line-formatted materials found on the web, one example embodiment of the invention includes the provision of an internet scripting language, such as hyper-text mark-up language (HTML) or XML, formatting that is interpreted by a web browser (such as Netscape's Navigator® browser) to display line-formatted web content in the manner illustrated with respect to Figures 3A and 3B. Thus, line-formatted web content is encoded with Scripting language codes that cause the browser to display content in scrollable multiple columns with line spill from one column to the next. Such a Scripting language encoded document 57 is illustrated in Figure 6. Alternatively, in another embodiment a web browser 55 includes the capability to display line-formatted web content in line spilling, scrollable columns without any special Scripting language encoding in the content.

Referring now to Figure 6, there is illustrated a simplified block diagram of a computer system 40. Computer system 40 includes a processing unit 42, and a system bus 44 connecting the processing unit 42 to system memory or disk drive

storage 46 and a video adapter 48 that in turn is connected to display device 10. Storage 46 includes, for example, a ROM BIOS 50, operating system 52, application and other programs 54, data 56, a web browser 55, and an HTLM document 57. A user input device 58, such as a mouse, keyboard or microphone for voice activation, provides a scrolling control signal to the system through port interface 59. A remote computing device 60 is also connected to bus 44 through a network interface 62. In one embodiment, the display methodology illustrated with respect to Figures 3A and 3B is implemented under software control, with the necessary software being either included in the ROM BIOS 50, operating system 52, application and other programs 54, such as a line editor or web browser, or in any combination thereof. Where the control is provided in software, the software may be encoded in any carrier medium such as but not limited to RAM, magnetic or optical storage media, or in electronic signal transmissions in, for example, a computer system or network. Alternatively, such control may be provided in under hardware control, or a combination of hardware and software control. In either case, line-formatted materials obtained from the storage 46 (which may be, for example and without limitation, RAM, hard disk, flexible or floppy disk, optical disk) or the remote computing device 60, or another source, are displayed in a scrollable, multicolumn, line-spilling mode under the control of a scrolling control signal received from a user.

Thus, the above-described embodiments of the invention provide for a more efficient and user-friendly manner of displaying line-formatted materials on large capacity displays. Embodiments of the invention take the form, for example, of a software product, such as an operating system, video display drive, or web browser, or the form of a computer system including a computer and display device programmed or configured with hardware to provide the scrolling mode of display of line-formatted materials as described above. An embodiment of the invention also takes the form of Scripting language codes that can be encoded into Scripting language encoded materials to direct a suitably programmed web browser to display the encoded materials as describe with respect to Figures 3A and 3B.

Although specific embodiments have been illustrated and described herein, it will be appreciated by those of ordinary skill in the art that any arrangement which is calculated to achieve the same purpose may be substituted for the specific embodiment shown. This application is intended to cover any adaptations or variations of the present invention. Therefore, it is manifestly intended that this invention be limited only by the claims and the equivalents thereof.